

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

2000-01 DRIVE AXLES

Front Axle - "T" Series

DESCRIPTION & OPERATION

NOTE: For information on "T" series Bravada, see AWD DIFFERENTIALS & AXLE SHAFTS - FRONT - "M" & "T" SERIES article.

Front axle on "T" Series models uses a 7 1/4" ring gear. The front axle has an electric 4WD engage/disengage feature which allows shifting in or out of 4WD while vehicle is moving (under most conditions). The 4WD feature is shifted by a vacuum actuation system.

The vacuum actuation system consists of a vacuum switch and vacuum actuator. Shift mechanism in transfer case triggers vacuum switch to apply engine vacuum to vacuum actuator after about a 3 second delay. The vacuum actuator, in turn, pulls on shift cable which pulls on shift fork in axle. This connects the right axle output shaft to the front axle differential. Torque is now available to front wheels.

Right side of axle assembly consists of a solid axle shaft which rides inside of a stationary axle housing. An outer axle shaft with CV joint is attached to each axle flange. Each axle shaft consists of a flexible shaft using a right tripod joint and outer CV joint. CV joint splined/threaded shaft on outer end of axle shaft slips through steering knuckle/hub assembly. See [Fig. 9](#). The differential uses a conventional ring and pinion gear set to transmit driving force of engine to the front wheels. Ring and pinion gear set transfers driving force at a 90-degree angle from front drive shaft to axle shafts/CV joints.

AXLE RATIO & IDENTIFICATION

Front axle identification is located on tag attached near axle housing.

LUBRICATION

Fill differential with 1.3 Qts. (1.2L) of 80W or 80W-90 GL-5 gear lubricant.

TROUBLE SHOOTING

NOTE: See appropriate table in TROUBLE SHOOTING article in GENERAL INFORMATION.

REMOVAL & INSTALLATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability

problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION before disconnecting battery.

CLUTCH SHAFT BEARING

Removal & Installation

Remove right axle shaft and housing assembly. See **RIGHT AXLE SHAFT & HOUSING**. Remove clutch shaft from differential carrier. Remove pilot bearing using Pilot Bearing Remover (J-34011). Lubricate NEW pilot bearing with gear oil. Install NEW pilot bearing using Pilot Bearing Installer (J-33842). To complete installation, reverse removal procedure.

DIFFERENTIAL CARRIER CASE MOUNTING BUSHINGS

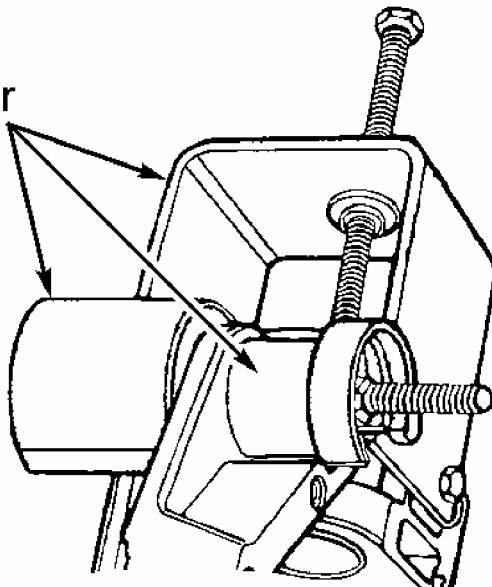
Removal & Installation

Remove differential carrier. See **DIFFERENTIAL CARRIER**. Using Carrier Bushing Remover/Installer (J-33791), press bushing out of carrier housing. See **Fig. 1**. To install, reverse tool and press NEW bushing into housing. Repeat procedure for other mounting bushing.

2001 Chevrolet S10 Pickup

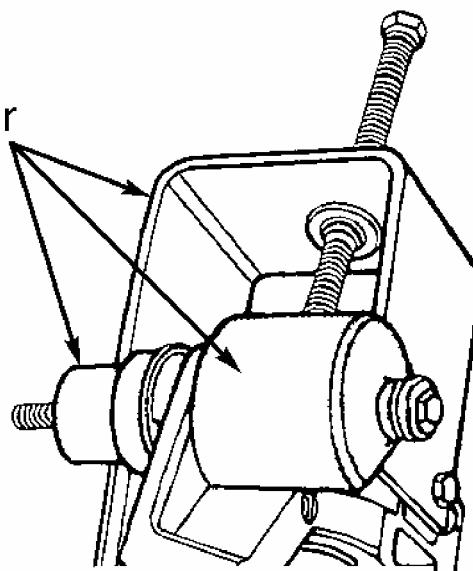
2000-01 DRIVE AXLES Front Axle - "T" Series

Carrier Bushing
Remover/Installer



REMOVAL

Carrier Bushing
Remover/Installer



INSTALLATION

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Fig. 1: Removing/Installing Carrier Case Bushing
Courtesy of GENERAL MOTORS CORP.

DIFFERENTIAL CARRIER

Removal

1. Unlock steering wheel. Raise and support vehicle. Remove front axle skip plate. Drain front differential. Disconnect axle vent hose. Disconnect steering relay rod from idler arm and pitman arm, and pull steering linkage forward. Mark front of drive shaft to ensure proper installation. Remove bolts and clamps. Wire drive shaft aside.
2. Remove wheels. Remove both outer axles shafts. See **OUTER AXLE SHAFTS**. Using a transmission jack, support differential carrier. Remove right axle shaft and housing. See **RIGHT AXLE SHAFT & HOUSING**. Remove differential carrier-to-frame bolts and nuts. Tip differential carrier counterclockwise while lifting (to gain clearance from mounting ears) and remove differential carrier.

Installation

To install, reverse removal procedure. Align all marks made during removal. Check fluid level in differential carrier. Tighten all bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

OUTER AXLE SHAFTS

CAUTION: DO NOT allow weight of vehicle to load front wheels, or operate vehicle with axle shafts or axle shaft nuts removed.

Removal

1. Unlock steering column. Raise and support vehicle. Remove wheels. Insert a long drift through caliper and into brake rotor vanes to prevent rotation. Remove axle hub nut and washer from axle shaft CV joint. See **Fig. 9**.
2. Remove long drift from brake rotor. Remove ABS wire and brake hose brackets from upper control arm and ball joint. Secure vehicle frame to hoist to prevent movement. Place a stand under lower control arm and support weight of steering knuckle. Partially reinstall axle hub nut. Using a brass drift, separate but do not remove axle shaft from steering knuckle. Disconnect shock absorber from lower mount.
3. Remove cotter pin and nut from upper and lower control arm ball joint stud. Using pry bar, pry between upper or lower control arm and frame. Have an assistant hammer on appropriate steering knuckle during prying. Remove upper and lower ball joint from steering knuckle. Push axle shaft from steering knuckle. Wire steering knuckle aside. Lower stand from lower control arm.
4. Remove front axle skid plate. Using a block of wood or brass drift, placed behind tripot housing, drive outer axle shaft out of front axle. Pull axle shaft straight out of front axle. Support axle shaft so as not to tear dust boot. DO NOT damage front axle outer seals.

Installation

1. DO NOT lubricate differential carrier axle seals. To prevent dust boot damage, cover

shock mounting lower bracket, lower control arm ball joint stud and all other sharp edges with shop towels. When installing axle shaft into front axle, align splines and center drive axle into front axle. Push shaft until snap ring seats into place.

2. Start steering knuckle onto axle shaft while guiding lower ball joint stud. To complete installation, reverse removal procedure. Tighten all bolts and nuts to specification. See **TORQUE SPECIFICATIONS**.

PINION FLANGE & OIL SEAL

Removal

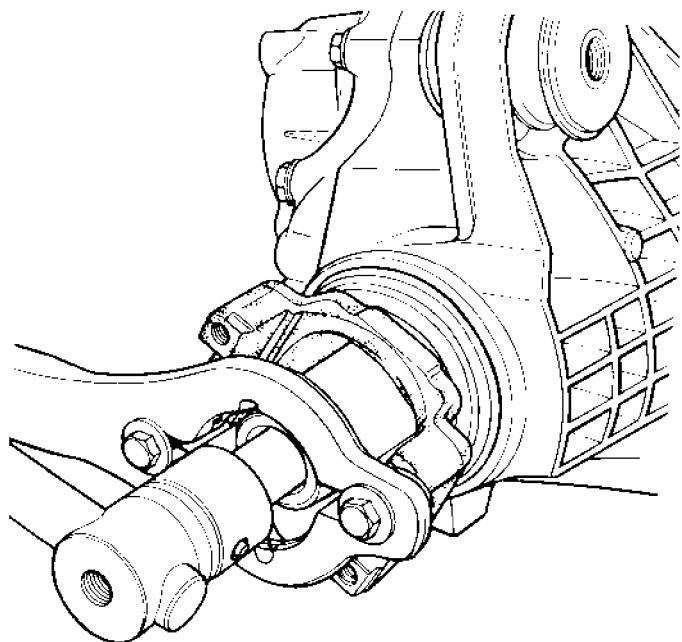
1. Unlock stirring column. Raise and support vehicle. Remove front wheel assembly. Remove and support front brake caliper. Remove brake pads and caliper bracket. Remove rotor. Remove front axle skid plate. Mark position of drive shaft and pinion flange to ensure correct installation. Remove bolts and retainers from pinion flange. Remove drive shaft from pinion flange, and wire aside.
2. Measure amount of torque required to rotate pinion for reassembly. Mark pinion flange, pinion shaft and pinion nut to ensure alignment and bearing preload are maintained on installation. Record number of exposed threads on pinion shaft for reassembly. Using Pinion Flange Remover Set (J-8614-01), hold pinion flange stationary and remove pinion flange nut and washer. Place drain pan under pinion area of differential carrier. Remove pinion flange and oil seal. See **Fig. 2**.
3. Clean pinion flange in solvent and inspect seal surface of pinion flange for nicks, burrs or damage (such as a groove worn into pinion flange by oil seal). Repair or replace as necessary.

Installation

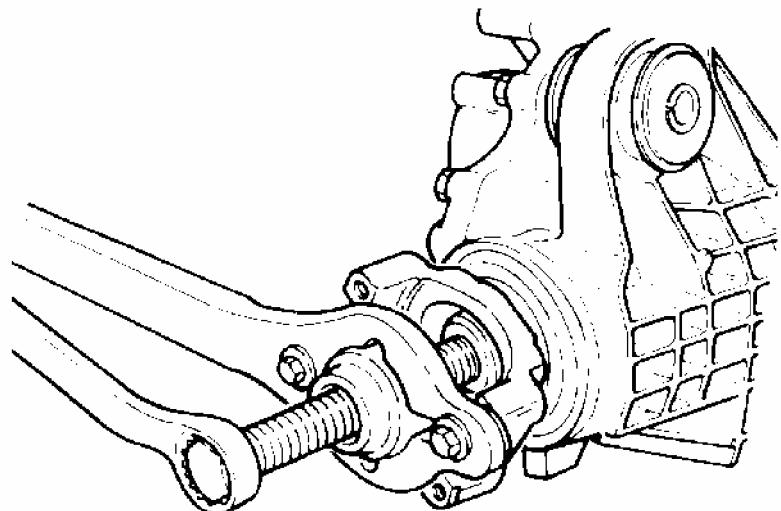
1. Apply sealant to inside sealing surface of pinion flange. Lubricate outside pinion flange surface and sealing lip of oil seal. Install oil seal using seal installer. DO NOT hammer pinion flange onto pinion shaft, pinion components may be damaged. Install pinion flange onto pinion shaft with marks aligned. Install pinion flange by tapping it with a soft-face hammer until a few pinion shaft threads show through flange.
2. Install pinion nut and tighten to position marked on pinion shaft. Tighten nut until pinion end play is just taken up. Rotate pinion while tightening nut to seat bearings. Tighten pinion shaft nut in small increments, until rotating torque if 3-5 INCH lb. greater than recorded totaling torque. If rotating torque is exceeded, pinion will have to be removed and a new collapsible spacer installed.
3. Once specified torque is obtained, rotate pinion several times to ensure bearings have seated. Recheck rotating torque and adjust if necessary. To complete installation, reverse removal procedure. Align all marks made during removal. Tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**. Check gear oil level.

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series



PINION NUT REMOVAL



PINION FLANGE REMOVAL

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Fig. 2: Removing Pinion Nut & Flange
Courtesy of GENERAL MOTORS CORP.

RIGHT AXLE SHAFT & HOUSING

Removal

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

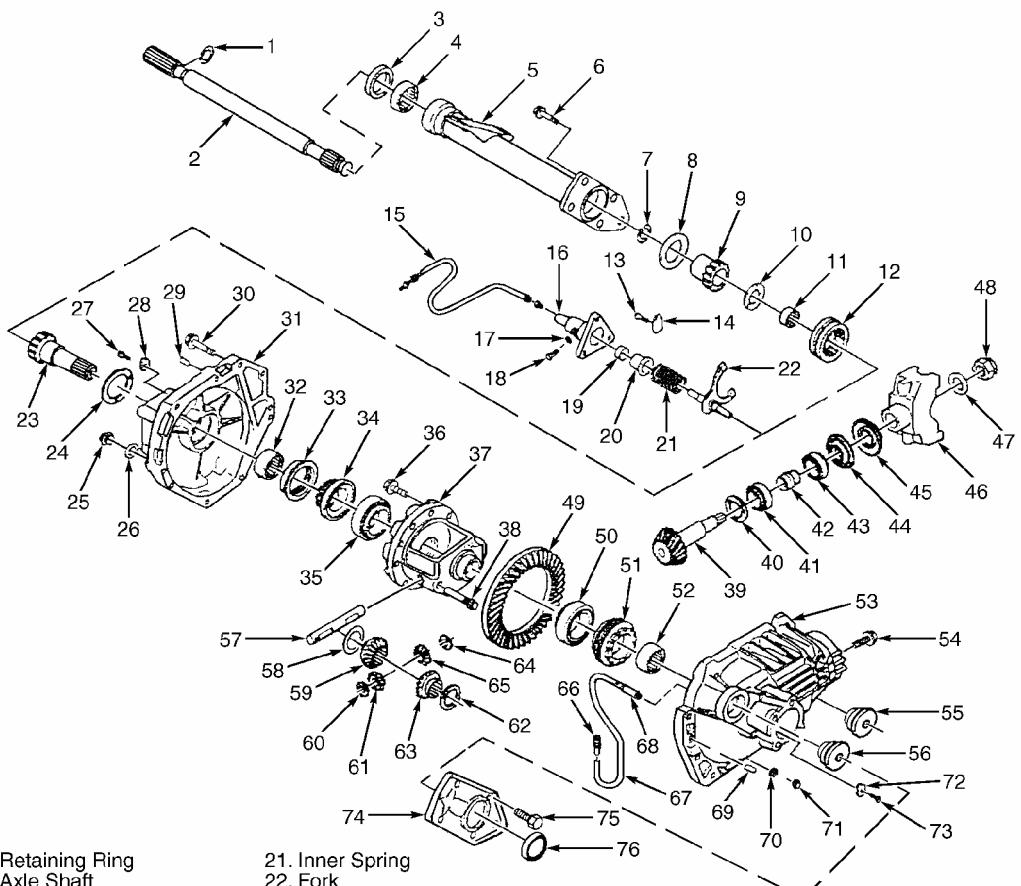
1. Raise and support vehicle. Place drain pan under right axle shaft housing. Remove right outer axle shaft. See **OUTER AXLE SHAFTS**. DO NOT damage seal. Remove 5 right axle shaft housing to differential carrier bolts. Remove shift cable housing assembly. Remove 2 right axle shaft housing to frame bracket bolts. Ensure that thrust washers, clutch gear, clutch sleeve and clutch shaft are not damaged, and do not fall out of differential carrier.
2. Remove right axle shaft and housing assembly. Place right axle shaft housing in a vise using mounting flange. Tap out axle shaft using soft mallet. Separate inner axle shaft and clutch gear, if necessary. Remove right axle shaft from housing. Inspect right axle shaft pilot and clutch shaft pilot bearing for wear. Inspect right axle shaft seal, bearing and shift cable housing seal for wear. Replace as necessary. Clean sealing surfaces of right axle shaft housing differential carrier.

Installation

1. To install, apply Sealant (GM 1052942 or Loctite 518) on axle housing to differential surface. Ensure thrust washers, clutch shaft, clutch sleeve and clutch gear are in place before installation. Install clutch gear thrust washer to housing as illustrated. See **Fig. 4**. Use grease to hold washer in place. Install axle shaft and housing assembly to differential carrier. Install axle shaft housing to differential carrier bolt, finger tight, at one o' clock position. Position shaft cable housing on axle housing flange.
2. Pull axle shaft and housing assembly down in order to install remaining bolts. Install and tighten all nuts and bolts to specification. See **TORQUE SPECIFICATIONS**. To inspect operation of shift mechanism, install Hub Engagement Tool (J337798) into shift fork. Check for rotation of axle shaft. Install shift cable and indicator assembly. To complete installation, reverse removal procedure. Top off gear oil.

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series



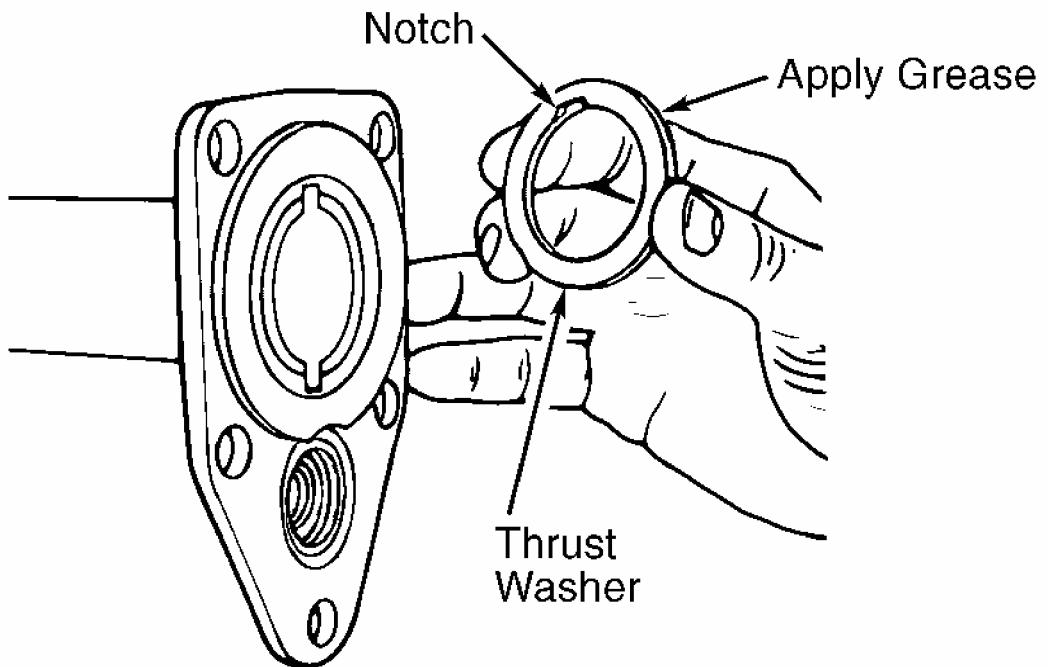
- | | | | |
|-------------------|-----------------------|---------------|-----------------------|
| 1. Retaining Ring | 21. Inner Spring | 41. Bearing | 59. Side Gear |
| 2. Axle Shaft | 22. Fork | 42. Spacer | 60. Washer |
| 3. Seal | 23. Clutch Shaft | 43. Bearing | 61. Pinion Gear |
| 4. Bearing | 24. Washer | 44. Seal | 62. Washer |
| 5. Housing | 25. Drain Plug | 45. Deflector | 63. Side Gear |
| 6. Bolt | 26. Drain Plug Gasket | 46. Yoke | 64. Washer |
| 7. Retaining Ring | 27. Nut | 47. Washer | 65. Pinion Gear |
| 8. Washer | 28. Nut Lock | 48. Nut | 66. Vent |
| 9. Clutch Gear | 29. Pin | 49. Ring Gear | 67. Hose |
| 10. Washer | 30. Bolt | 50. Bearing | 68. Hose End |
| 11. Bearing | 31. Carrier | 51. Insert | 69. Pin |
| 12. Clutch Sleeve | 32. Bearing | 52. Bearing | 70. Drain Plug Gasket |
| 13. Bolt | 33. Adjuster | 53. Carrier | 71. Drain Plug |
| 14. Lock | 34. Sleeve | 54. Bolt | 72. Nut Lock |
| 15. Cable | 35. Bearing | 55. Bushing | 73. Nut |
| 16. Housing | 36. Bolt | 56. Bushing | 74. Cover |
| 17. Seal | 37. Case | 57. Shaft | 75. Bolt |
| 18. Switch | 38. Bolt | 58. Washer | 76. Seal |
| 19. Outer Spring | 39. Pinion Gear | | |
| 20. Seal | 40. Shim | | |

Fig. 3: Exploded View Of 4WD "T" Series differential carrier
Courtesy of GENERAL MOTORS CORP.

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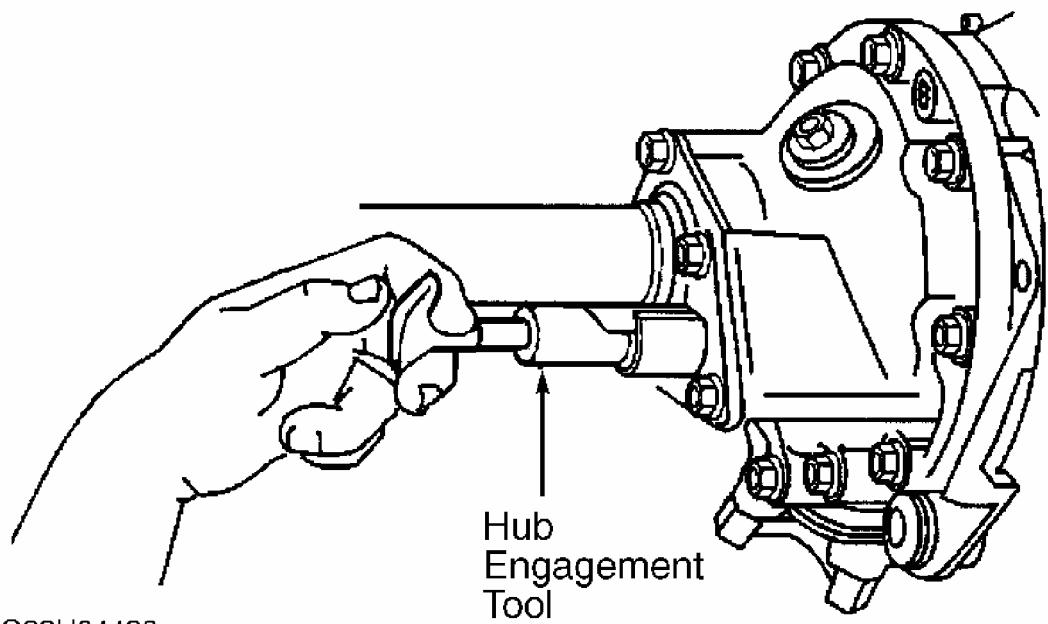
2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series



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Fig. 4: Installing Clutch Gear Thrust Washer
Courtesy of GENERAL MOTORS CORP.



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Fig. 5: Identifying Hub Engagement Tool
Courtesy of GENERAL MOTORS CORP.

RIGHT AXLE SHAFT BEARING

Removal & Installation

Remove right axle shaft and housing assembly. See **RIGHT AXLE SHAFT & HOUSING**. Place right axle shaft housing in a vise using mounting flange. Remove right axle shaft seal. Using bearing remover and slide hammer, remove right axle shaft bearing. To install, lubricate bearing using gear oil. Using Bearing Installer (J42211) and Driver Handle (J8092), install right axle shaft bearing. Bearing is installed to proper depth when tool is flush with housing end. Using Seal Installer (J23911), install NEW seal. Drive in seal until seal flange is flush with housing end. To complete installation, reverse removal procedure.

SHIFT CABLE HOUSING SEAL

Removal & Installation

Remove right axle shaft. See **RIGHT AXLE SHAFT & HOUSING**. Using a punch, drive shift cable housing seal out of axle housing. To install reverse removal procedure. Using Seal Installer (J33799), install seal.

VACUUM ACTUATOR

Removal & Installation

Remove battery and tray. Disconnect vacuum line from actuator. Remove shift cable. Remove vacuum actuator bolts and actuator. To install, reverse removal procedure. When installing hose, ensure it is routed correctly. Ensure hose is free of kinks and clear of sharp components. Ensure vent is not plugged.

OVERHAUL

DIFFERENTIAL CARRIER

Disassembly

1. Remove differential carrier. See **DIFFERENTIAL CARRIER** under REMOVAL & INSTALLATION. Remove bolts, shift cable housing and spring. Remove right axle housing, right axle shaft assembly and thrust washers. See **RIGHT AXLE SHAFT & HOUSING** under REMOVAL & INSTALLATION.
2. Remove shift fork assembly consisting of sleeve, springs and seals. See **Fig. 3**. Remove right axle shaft. Remove clutch gear and retaining ring. Remove right axle shaft to housing seal. Using bearing remover and slide hammer, remove right axle shaft bearing. Remove thrust washer, clutch sleeve and shaft.

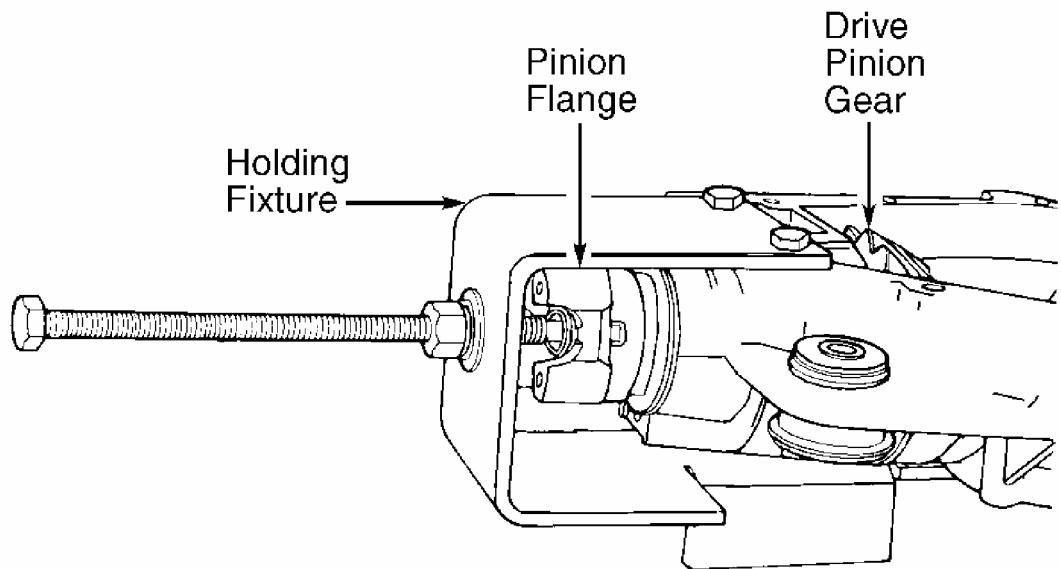
2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

3. Remove right output shaft bearing using Bearing Remover (J-34011). Remove washer from right side of carrier assembly. Remove left side carrier cover bolts. Remove left side cover and seal assembly. Remove carrier halves assembly bolts. Insert a screwdriver into slots provided. Pry to separate carrier.
4. Remove differential assembly from carrier. See **Fig. 3**. Remove bolts and lock tabs from side bearing adjuster sleeves. Remove bearing cups and sleeves from carrier. Using Side Bearing Adjusting Socket (J-42213), rotate left adjusting sleeve until cup is pushed out of carrier. Using Side Bearing Adjusting Socket (J-33792), rotate right adjusting sleeve until cup is pushed out of carrier.
5. Remove side bearings from right adjusting sleeve using Bearing Remover (J-21551). Remove side bearings from left adjusting sleeve using Bearing Remover (J-36611). Mark pinion flange, pinion shaft and pinion nut to ensure alignment and bearing preload are maintained on installation. Record number of exposed threads on pinion shaft for reassembly. Using Pinion Yoke Holder (J-8614-01), remove pinion yoke nut and washer. Using Pinion Bearing Cup Remover (J-33837), remove pinion out of carrier from left carrier case half. See **Fig. 6**. Remove pinion yoke and deflector. Remove pinion, spacer, pinion bearing and shim. Remove pinion spacer.
6. Press bearing from pinion. Remove shim. Using Pinion Bearing Cup Remover (J-33837), remove outer pinion bearing, seal and cup. See **Fig. 7**. Remove differential pinion bolt and shaft from differential case. Remove differential pinion gears and thrust washers. Mark side gears and case for reinstallation. Remove side gear and thrust washers. Remove ring gear bolts. Using a brass drift, remove ring gear. DO NOT pry between ring gear and differential case. Using Differential Side Bearing Puller (J-22888-20), remove side bearings. Using Bushing Remover (J-33791), remove case busing.

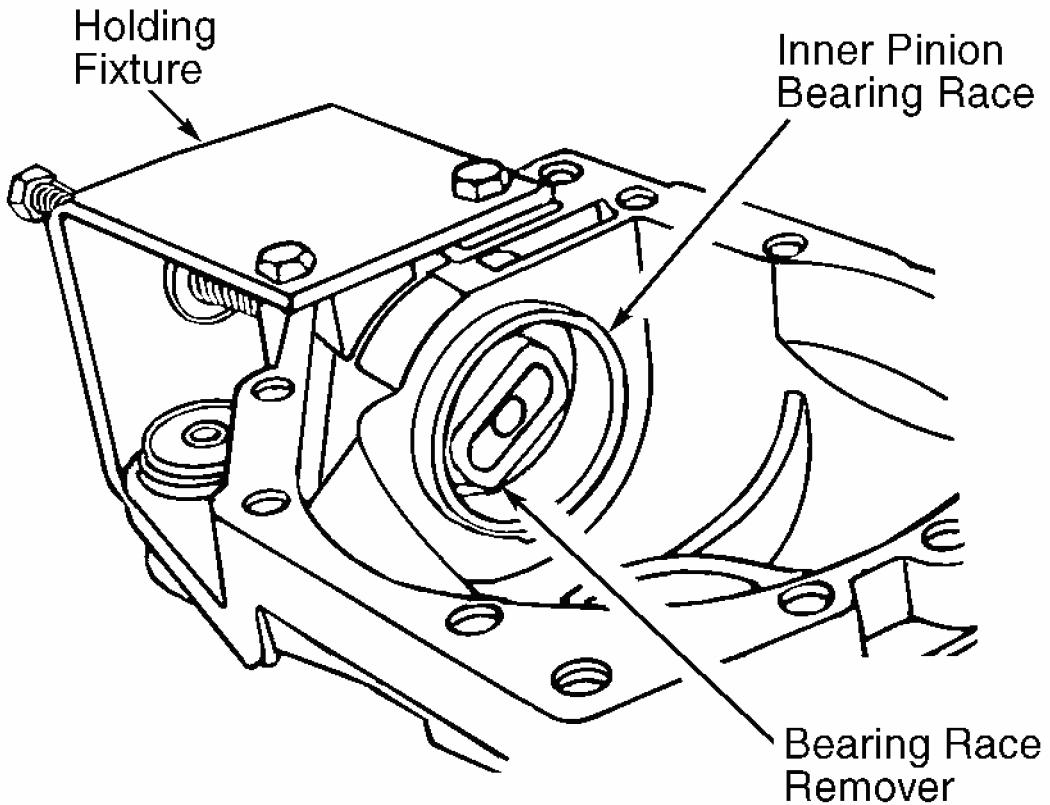
2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series



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Fig. 6: Installing Pinion Holding Fixture Tool
Courtesy of GENERAL MOTORS CORP.



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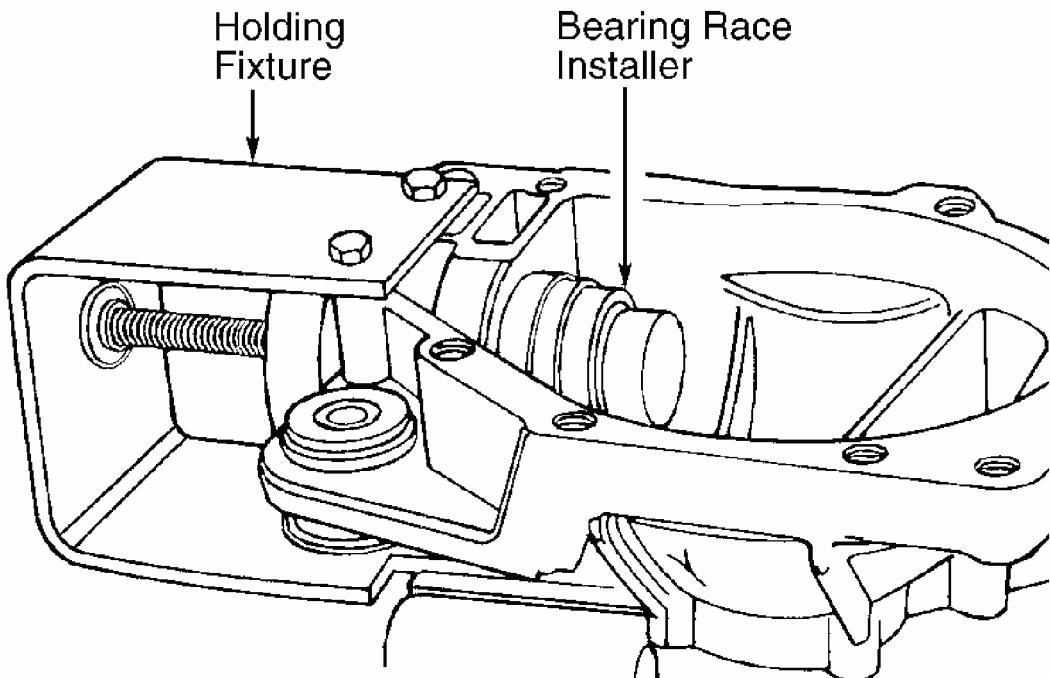
Fig. 7: Removing right Pinion Bearing Race
Courtesy of GENERAL MOTORS CORP.

Cleaning & Inspection

1. Clean all parts in cleaning solvent. Inspect ring and pinion gear teeth for cracking, chipping, scoring or excessive wear. Inspect pinion gear splines for wear. Inspect pinion yoke splines for wear. Inspect fit of pinion yoke on pinion gear. Inspect sealing surface of pinion yoke for nicks, burrs or rough tool marks. Inspect all parts for excessive wear. Replace ring and pinion gears as a set. Replace as required.
2. Inspect bearings for smooth rotation after oiling. Inspect bearing rollers for wear. Inspect bearing cups for wear, cracks or scoring. DO NOT replace bearing cups if, bearings have very small scratches and pits on rollers and cups. Low mileage bearings will have this from initial preload. Replace bearings and cups as a set. Replace as required.
3. Inspect shims and thrust washers for cracks and chips. Replace damaged shim with one of same size. Inspect adjuster sleeves for damaged threads. Replace as required.

Reassembly

1. Using Output Shaft Bearing Installer (J-33788), install bearing into right sleeve. Using Bearing Installer (J-42211), install bearing into left sleeve. Install sleeves in into carrier. Thread sleeves in completely. Using Side Bearing Cup Installer (J-23423-A) and Driver Handle (J-8092), install side bearing cups into carrier.



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Fig. 8: Installing Right Pinion Bearing Race
Courtesy of GENERAL MOTORS CORP.

2. Place differential case assembly into carrier half that contains pinion gear. Using Side Bearing Adjusting Socket (J-42213), turn left sleeve in toward differential case until backlash is felt between ring and pinion gear. Assemble carrier halves. DO NOT use sealer. If carrier halves do not contact completely, using Side Bearing Adjusting Socket (J-33792), back out right adjusting sleeve.
3. Install pinion bearings using Holding Fixture (J-33837-1) and Bearing Race Installer (J-33837-4) until races are seated in carrier. See Fig. 8 . Lubricate right and outer bearings, then set pinion depth. See **DRIVE PINION DEPTH** under **ADJUSTMENTS**.
4. Install appropriately sized shim onto pinion. Shim size was previously determined during pinion depth adjustment. Ensure bearing cups are installed. Using Pinion Bearing Installer (J-33785), install outer pinion bearing onto pinion. Install NEW collapsible spacer onto pinion shaft. Lubricate outer pinion bearing, and install inner pinion bearing and pinion seal into carrier case using Seal Installer (J-33782). Insert

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

pinion, right bearing and collapsible spacer, into carrier case.

5. Apply Sealer (GM P/N 12346004) to inside sealing surface of pinion yoke. Apply Seal Lubricant (GM P/N 12377985) to outside sealing surface of pinion yoke. Install pinion yoke in same position as marked during removal. Install drive pinion yoke by tapping it with a soft-face hammer until a few pinion shaft threads show through yoke. DO NOT hammer pinion yoke.
6. Hold pinion in place from inside carrier half. Using Pinion Yoke Holder (J-8614), install NEW washer and new nut. Hold flange while slowly tightening nut and checking pinion flange until no end play is present. DO NOT tighten nut any further. Reference number of exposed threads on pinion stem recorded during removal.
7. Rotate pinion several times to ensure bearings have been seated. Recheck end play. Set final pinion preload to 15-25 INCH lbs. (1.7-2.8 N.m) by tightening pinion nut in small increments, rotating pinion between increments. Each increment increases preload by several INCH lbs.
8. If preload specification is exceeded, remove pinion and install NEW collapsible spacer. Once preload has been obtained, rotate pinion several times to ensure bearings have seated and recheck preload.
9. Install side gears and thrust washers into differential case. If old side gears are being reinstalled, ensure they are placed in their original locations as marked during disassembly.
10. Position one pinion gear between side gears and rotate gears until pinion gear is directly opposite opening in case. Place remaining pinion gear between side gears. Ensure holes in both pinion gears line up. Rotate pinion gears toward opening just enough to allow installation of thrust washers.
11. Install differential pinion gear shaft. Install pinion gear shaft bolt. Install ring gear onto differential assembly. Tighten NEW bolts alternately in progressive steps to 59 ft. lbs. (80 N.m). Ring gear uses left-hand thread bolts.
12. Press side bearings onto differential assembly using Side Bearing Installer (J-33790) and Driver Handle (J-8092).
13. Using same side bearing adjusting socket used during disassembly, install sleeves into carrier case. Install side bearing races into carrier using Race Installer (J-23423-A). Place differential assembly into left carrier case half. Turn left sleeve inward until backlash is felt between ring and pinion.
14. Remove carrier case from holding fixture, and attach carrier halves together using 4 bolts. If halves DO NOT make complete contact, using Side Bearing Adjusting Socket (J-33792), back out right sleeve. Install carrier case bolts and tighten to 37 ft. lbs. (50 N.m). Set ring gear backlash adjustment to specification. See **RING GEAR BACKLASH** under ADJUSTMENTS.
15. Install side bearing adjusting sleeve lock tabs over left and right sleeves. Remove 4 bolts holding axle carrier halves together and separate carrier halves. Apply Sealant (GM 1052357) to one carrier housing surface.

16. Reconnect axle carrier housing halves. Install 10 attaching bolts and tighten to specification. See **TORQUE SPECIFICATIONS**. Install drive seal into left side cover. Apply Sealant (GM P/N 1052357) to left side cover. Install 6 cover-to-carrier bolts securing left side cover and tighten to specification. See **TORQUE SPECIFICATIONS**.
17. Install NEW pilot bearing into left output shaft using Pilot Bearing Installer (J-42211). Install shaft seal using Seal Installer (J-23911). Install shift housing seal using Shift Cable Housing Seal Installer (J-33799). Install NEW clutch shaft pilot bearing using Pilot Bearing Installer (J-33842). Install washer onto clutch shaft, and insert clutch shaft into carrier. Install clutch sleeve. Install thrust washer using grease. Align notch and tab as illustrated. See **Fig. 4**. Install spring, shift shaft and fork.
18. Install inner axle shaft to housing. Remove all oil and grease from axle shaft and carrier gasket surfaces. Apply Sealant (GM P/N 1052357) to carrier. Install shaft and housing assembly to carrier. Install 2 upper bolts finger-tight. Install remaining shift cable housing bolts. Install bushings using Bushing Remover/Installer (J-33791).
19. Insert Hub Engagement Tool (J-33798) in to shift fork. See **Fig. 5**. Turn axle shaft while engaging and disengaging shift mechanism using hub engagement tool. Mechanism should operate smoothly. If mechanism does not operate smoothly, remove housing and inspect for damaged or improperly installed parts.

OUTER AXLE SHAFTS

Disassembly, Cleaning & Inspection (Inner Joint & Dust Boot)

CAUTION: If not handled properly, tripot balls and needle rollers may separate from spider assembly.

1. Remove clamps from dust boot. Using grinder, cut through swage ring. Remove tripot housing and tripot bushing. Wipe grease off of tripot assembly roller bearings and housing. Thoroughly degrease housing and tripot bushing. Remove any corrosion on axle sealing surface. Allow housing and tripot bushing to dry.
2. Slide dust boot away from spider assembly. Remove outer spacer ring. Remove spider assembly. Remove right spacer ring and dust boot. Clean axle shaft. Remove any rust in boot mounting area. Inspect needle rollers, bearings and spider assembly. Check tripot housing for excessive wear, cracks or damage.

Reassembly

1. Slide NEW small swage clamp and dust boot onto axle shaft. See **Fig. 10**. Place axle shaft in Swage Clamp Installer (J41048) as illustrated. See **Fig. 11**. Ensure dust boot is not pinched. Tighten swage clamp installer bolts by hand until snug. Ensure boot, housing and swage clamp are aligned. Tighten each bolt 180 degrees at a time until both sides are bottomed out. Remove swage clamp installer and check swage clamp for deformities. Ensure swage clamp covers entire swaging area. Reswage clamp as

necessary. Check swage clamp for any lip deformities.

2. Install Convolute Retainer (7848076) over dust boot. See [Fig. 12](#). Ensure to capture 4 convolutions. Install spacer rings and spider assembly. Ensure spacer rings are fully seated. Pack boot and housing with pre-measured amount of grease supplied with repair kit. Check inboard stroke position. See [Fig. 13](#). To complete installation, reverse removal procedure.

Disassembly, Cleaning & Inspection (Outer Joint & Dust Boot)

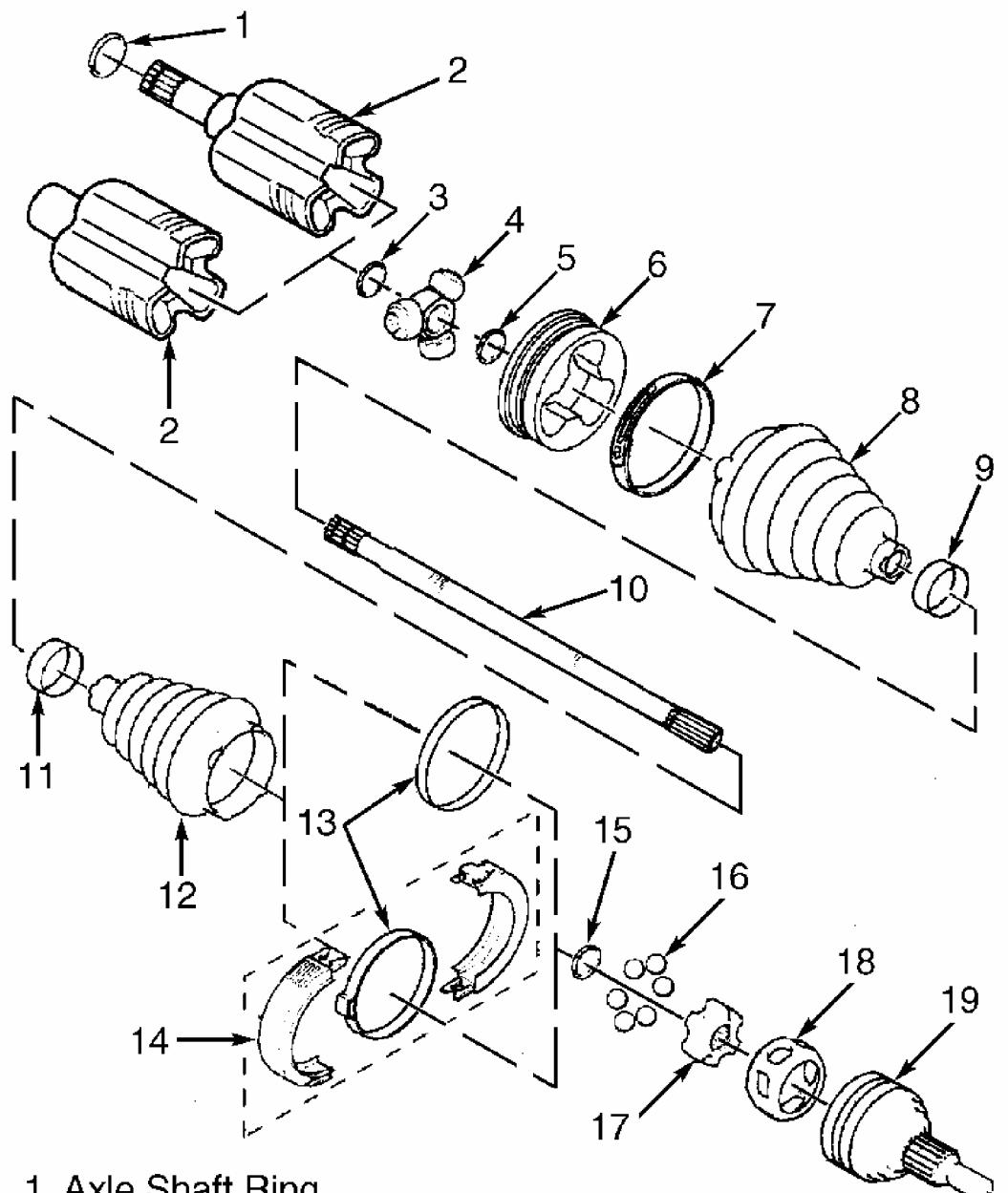
1. Place axle shaft in a soft jaw vise. Remove race retaining ring. Remove clamps from dust boot. Using grinder, cut through swage ring. DO NOT damage outer race. Slide dust boot away from CV joint. Wipe all grease away from CV joint. Spread open snap ring located in right race and remove CV joint. See [Fig. 9](#). Discard old dust boot. Using a brass drift, gently tap edge of cage in order to tilt it. Remove visible ball. Continue to tap around circumference of cage to remove remaining balls.
2. Pivot cage and right race 90 degrees to centerline of outer race. Align cage windows with lands of outer race. See [Fig. 14](#). Lift out cage and inner race. Rotate right race upward and remove inner race from cage.

Reassembly

1. Thoroughly degrease all CV joint parts. Check outer CV joint assembly for unusual wear, cracks or other damage. Replace as necessary. Clean any rust at dust boot mounting area. Apply a light coat of grease on inner and outer race grooves. Reassemble CV assembly by reversing removal procedure. Slide NEW small swage clamp and dust boot onto axle shaft. See [Fig. 10](#). Place axle shaft in Swage Clamp Installer (J41048). See [Fig. 11](#).
2. Ensure dust boot is not pinched. Tighten bolts by hand until snug. Ensure boot, housing and swage clamp are aligned. Tighten each bolt 180 degrees at a time until both sides are bottomed out. Remove swage clamp installer and check swage clamp for deformities. Ensure swage clamp covers entire swaging area. Reswage clamp as necessary. Check swage clamp for any lip deformities.
3. Install a large retaining ring on dust boot. Pack boot and housing with pre-measured amount of grease supplied with repair kit. Slide CV joint onto axle shaft. An audible click should be heard when retaining snap ring engages. Pull on CV joint to verify engagement. Slide dust boot and retaining ring on to groove on CV joint. Remove any excess air. Secure retaining ring clamp as illustrated. See [Fig. 15](#).

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series



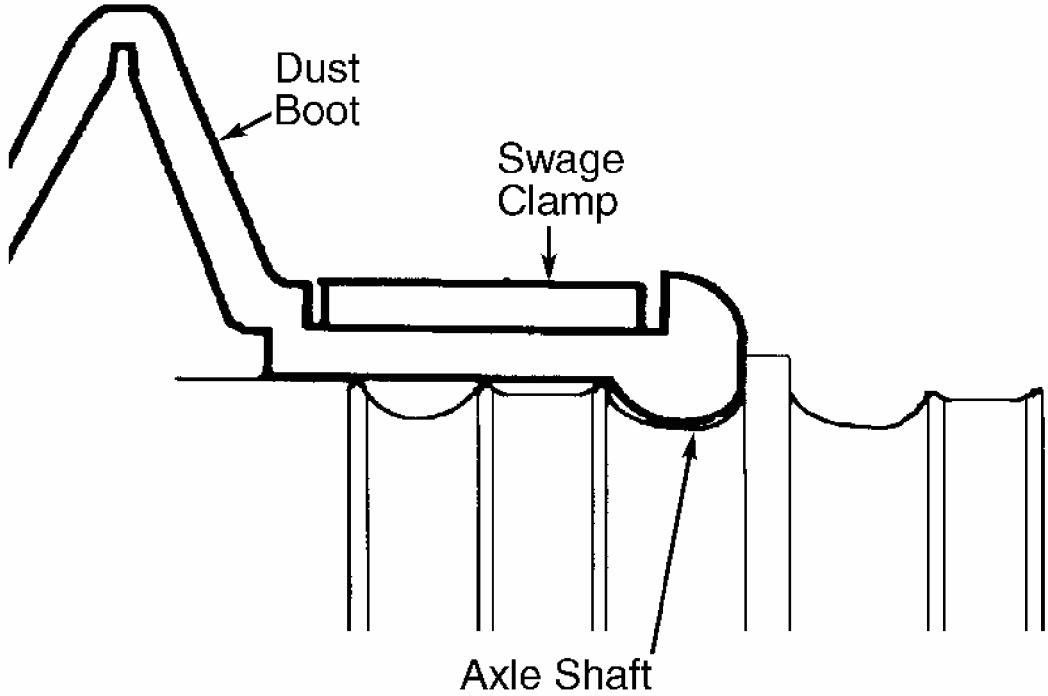
- 1. Axle Shaft Ring
- 2. Tripot Housing Assembly
- 3. Spacer Ring
- 4. Tripot Joint Spider Assembly
- 5. Spacer Ring
- 6. Tripot Bushing
- 7. Boot Retaining Clamp
- 8. Dust Boot
- 9. Boot Swage Ring
- 10. Axle Shaft
- 11. Boot Swage Ring
- 12. Dust Boot
- 13. Boot Swage Ring
- 14. Clamp Protector
- 15. Race Retaining Ring
- 16. Ball
- 17. Inner Race
- 18. Cage
- 19. Outer Race

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2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

Fig. 9: Exploded View Of Outer Axle Shaft
Courtesy of GENERAL MOTORS CORP.

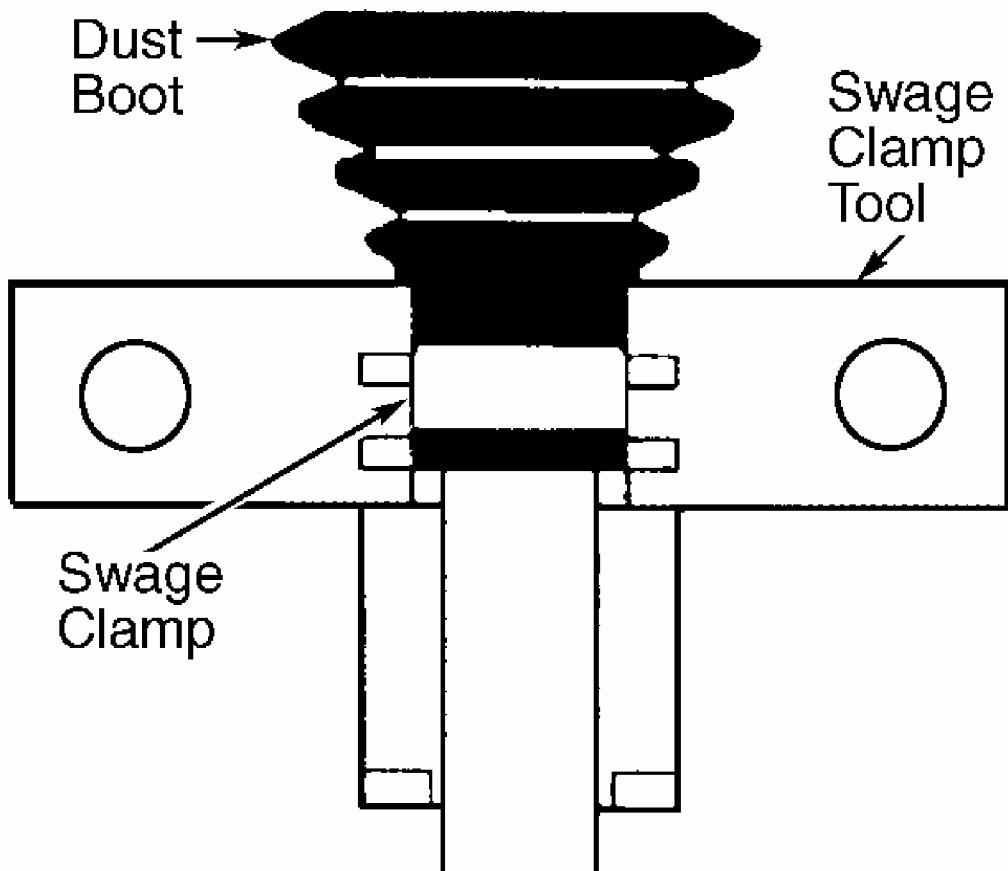


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Fig. 10: Installing Small Swage Clamp & Dust Boot
Courtesy of GENERAL MOTORS CORP.

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

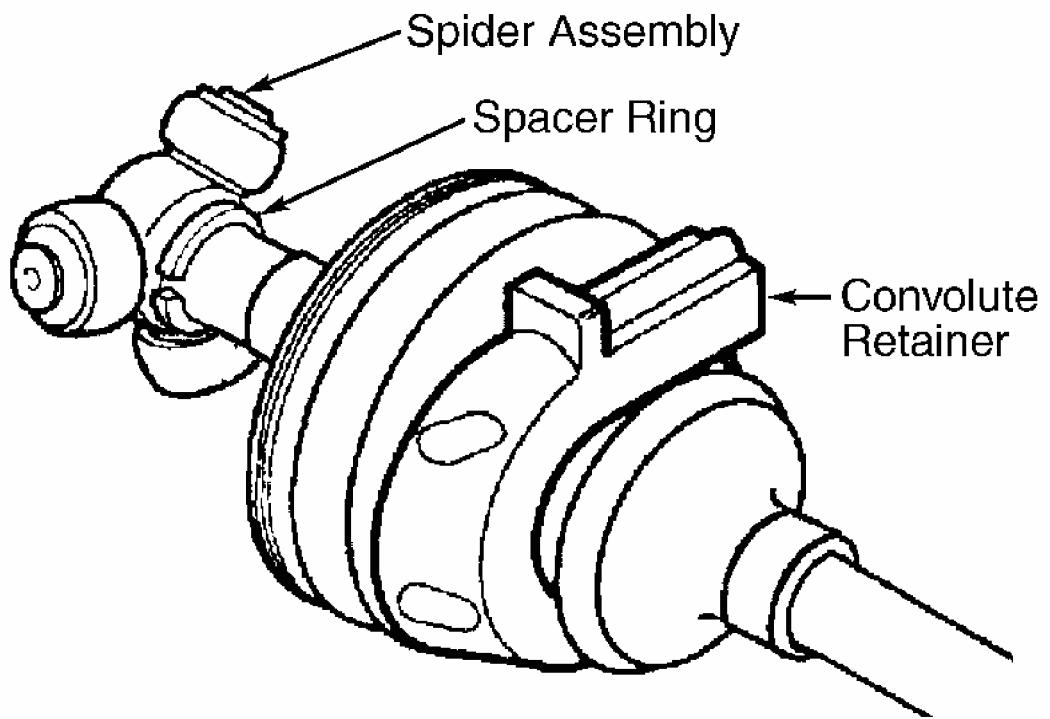


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Fig. 11: Identifying Swage Clamp Installer
Courtesy of GENERAL MOTORS CORP.

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

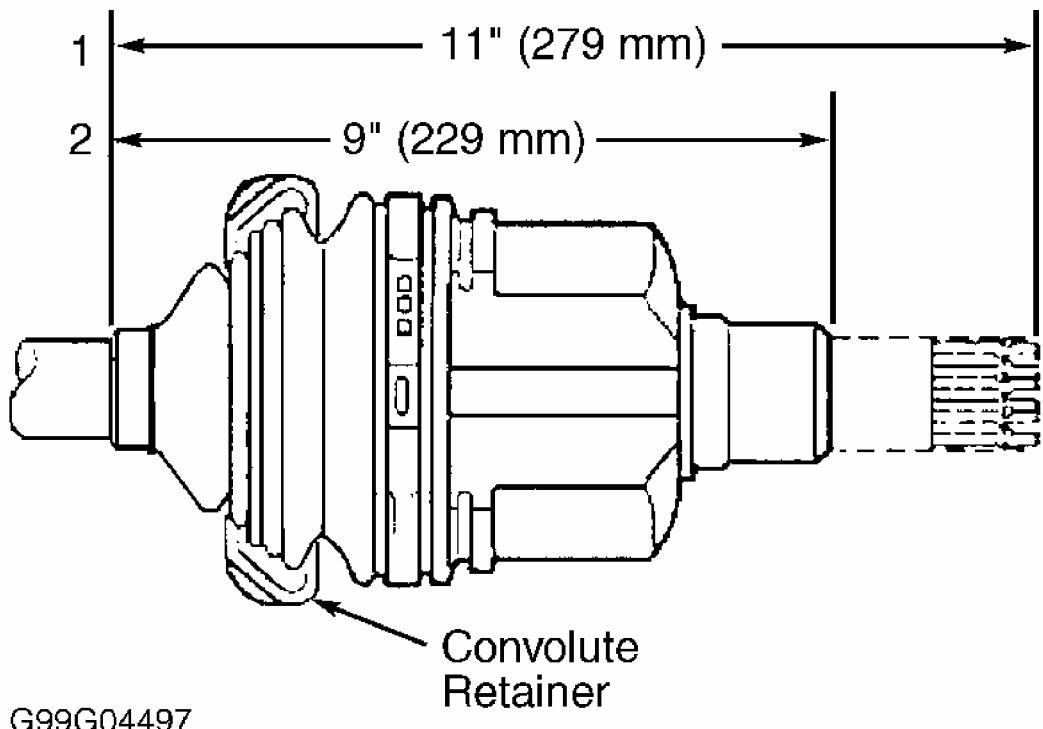


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Fig. 12: Identifying Convolute Retainer
Courtesy of GENERAL MOTORS CORP.

2001 Chevrolet S10 Pickup

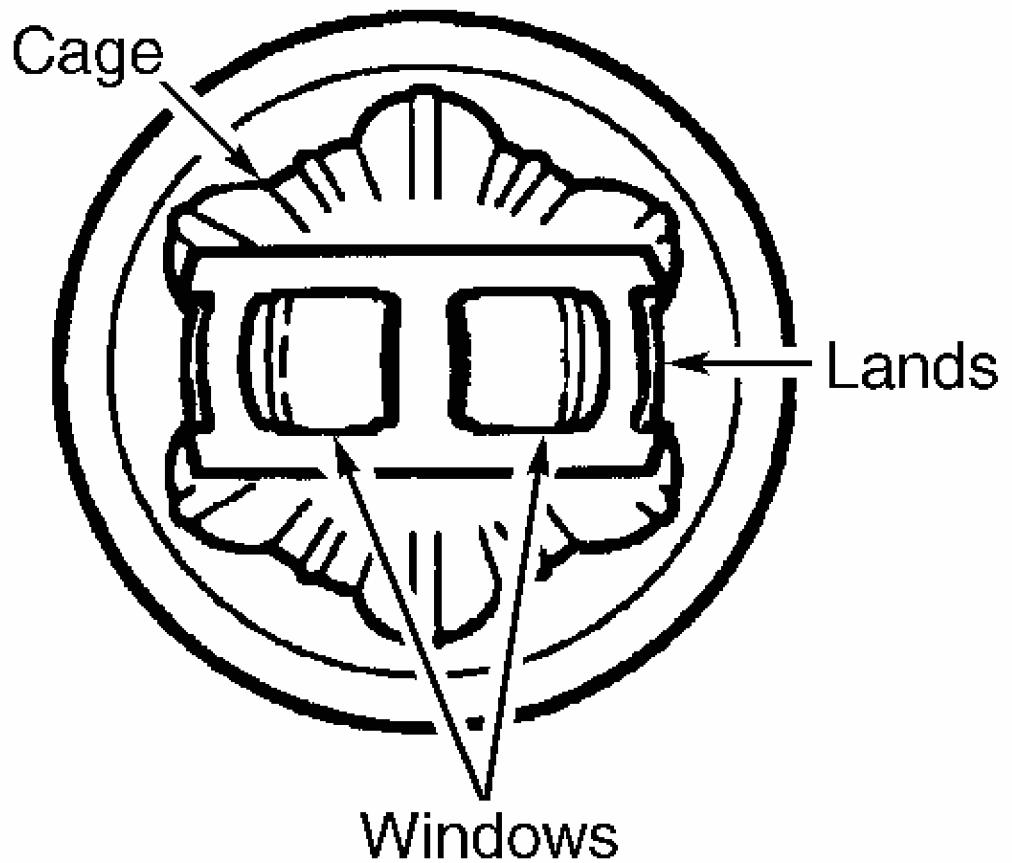
2000-01 DRIVE AXLES Front Axle - "T" Series



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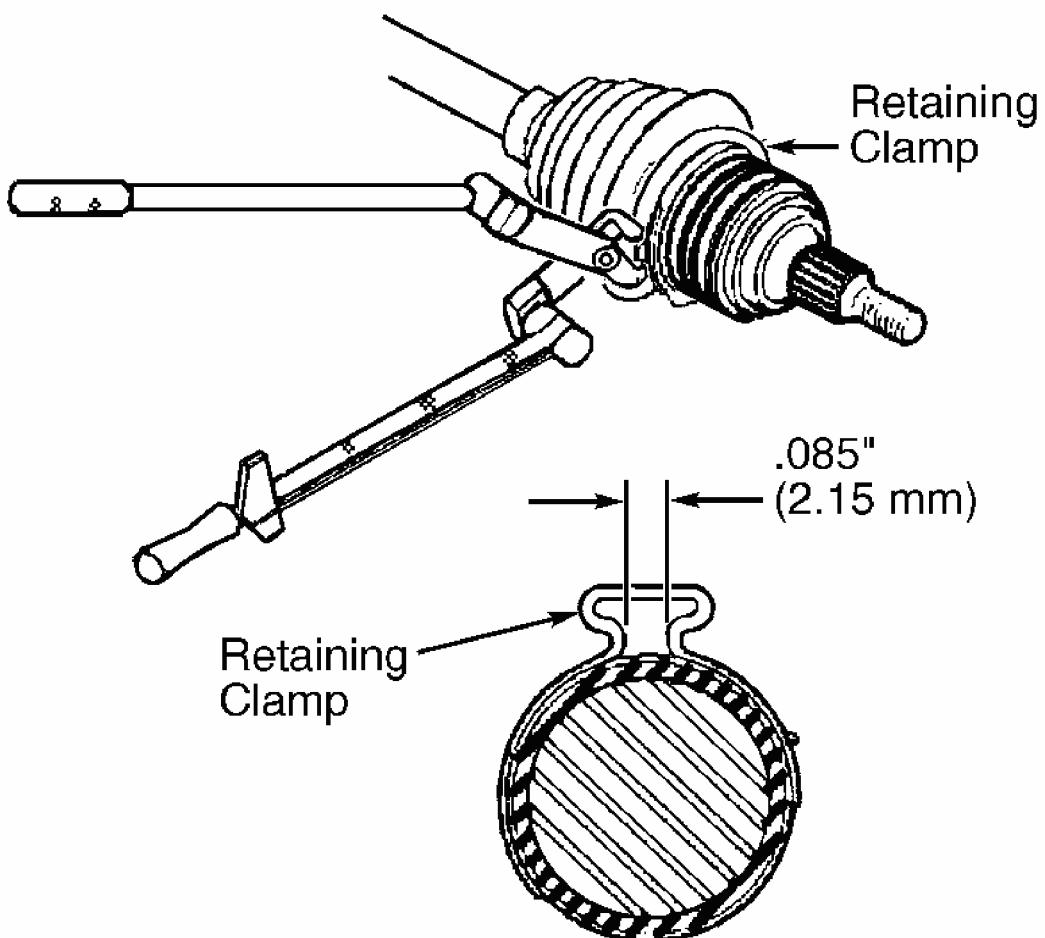
Fig. 13: Checking Inboard Stroke Position

Courtesy of GENERAL MOTORS CORP.



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Fig. 14: Aligning Cage Windows With Lands
Courtesy of GENERAL MOTORS CORP.



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Fig. 15: Securing Retaining Ring Clamp
Courtesy of GENERAL MOTORS CORP.

RIGHT AXLE SHAFT HOUSING ASSEMBLY

Disassembly

1. Remove right axle shaft & housing. See **RIGHT AXLE SHAFT & HOUSING** under REMOVAL & INSTALLATION. Place mounting flange of axle housing assembly in a vise. Remove springs, shift fork, and differential sleeve. Remove snap ring, connector gear and thrust washer from axle shaft.
2. Using a soft mallet, tap on flange end of axle shaft to remove axle shaft from housing. DO NOT hammer on pilot bearing stem end of axle shaft, severe damage will result. Using a screwdriver, pry out oil seal.
3. Using a Bearing Remover (J-29369-2) and slide hammer, remove axle bearing from housing.

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

Cleaning & Inspection

Wash all parts in solvent. Dry using compressed air. Inspect all parts for excessive wear and scoring. Inspect connector gear and axle shaft splines for wear, cracks, and twisted splines.

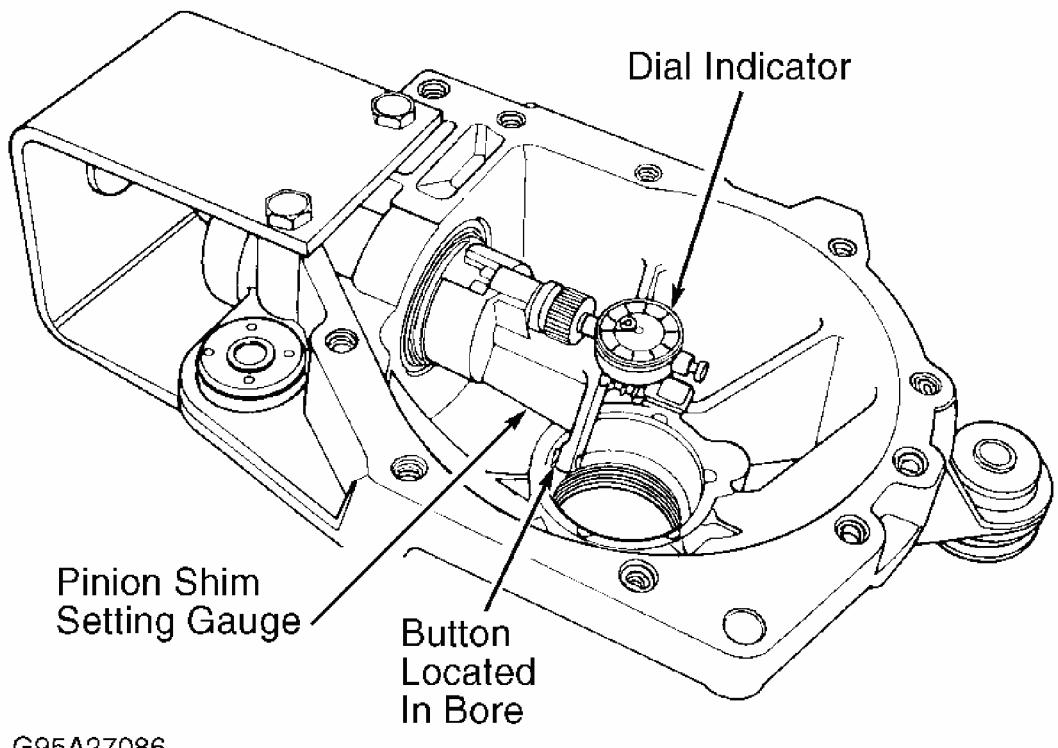
Reassembly

1. Clean gasket surfaces on axle housing and carrier housing. Lubricate NEW bearing using wheel bearing grease. Using Bearing Installer (J-33844), install axle bearing into housing. Lightly coat lip of NEW seal with grease. Install seal using Seal Installer (J-33893).
2. Install deflector to axle shaft (if removed) and insert axle shaft into axle housing. Install thrust washer, ensuring housing slots align with tabs on washer. See **Fig. 4**. Use wheel bearing grease to hold thrust washer in place.
3. Drive connector gear onto end of axle using a plastic hammer. Install snap ring. Ensure snap ring seats properly in groove. Ensure axle housing and carrier case sealing surfaces are clean. Install springs on shift fork. Insert shift fork into groove in differential sleeve. Install shift fork assembly into housing assembly at same time sleeve is installed onto connector gear.
4. Apply a bead of Sealant (GM P/N 12377985) to axle housing sealing surface. Assemble axle housing to carrier case. Install and tighten axle housing-to-carrier bolts to specification. See **TORQUE SPECIFICATIONS**. Inspect shift mechanism operation.

ADJUSTMENTS

DRIVE PINION DEPTH

1. Lubricate right and outer pinion bearings liberally with gear oil. Hold pinion bearings in position and install Pinion Shim Setting Gauge (J-33838). Set Dial Indicator (J-29763) to zero. Position indicator onto pinion shim setting gauge. See **Fig. 16**. Push dial indicator down until needle rotates about 3/4 turns to right. Tighten dial indicator in position.
2. Set bottom of pinion shim setting gauge on differential bearing bore. Rotate tool slowly back and forth until dial indicator reads lowest point of bore. Set dial indicator to zero. Repeat rocking action of tool to verify zero setting. Move tool button out of differential side bearing bore. Record dial indicator reading. Dial indicator reading equals shim size.



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Fig. 16: Pinion Shim Setting Gauge & Dial Indicator Installation & Measurement
Courtesy of GENERAL MOTORS CORP.

RING GEAR BACKLASH

1. Use Side Bearing Adjusting Socket (J-33792) and torque wrench to tighten right adjusting sleeve until no backlash is present. This torque measurement should be about 103 ft. lbs. (140 N.m).
2. Using Side Bearing Adjusting Socket (J-42213), tighten left adjusting sleeve until no backlash is present. This torque measurement should be about 103 ft. lbs. (140 N.m).
3. Mark location of adjusting sleeves in relation to carrier halves so notches can be counted when turned. See **Fig. 17**. Turn right sleeve OUT 2 notches using side bearing adjusting socket. Turn left sleeve IN one notch. Rotate pinion several times to seat bearings.

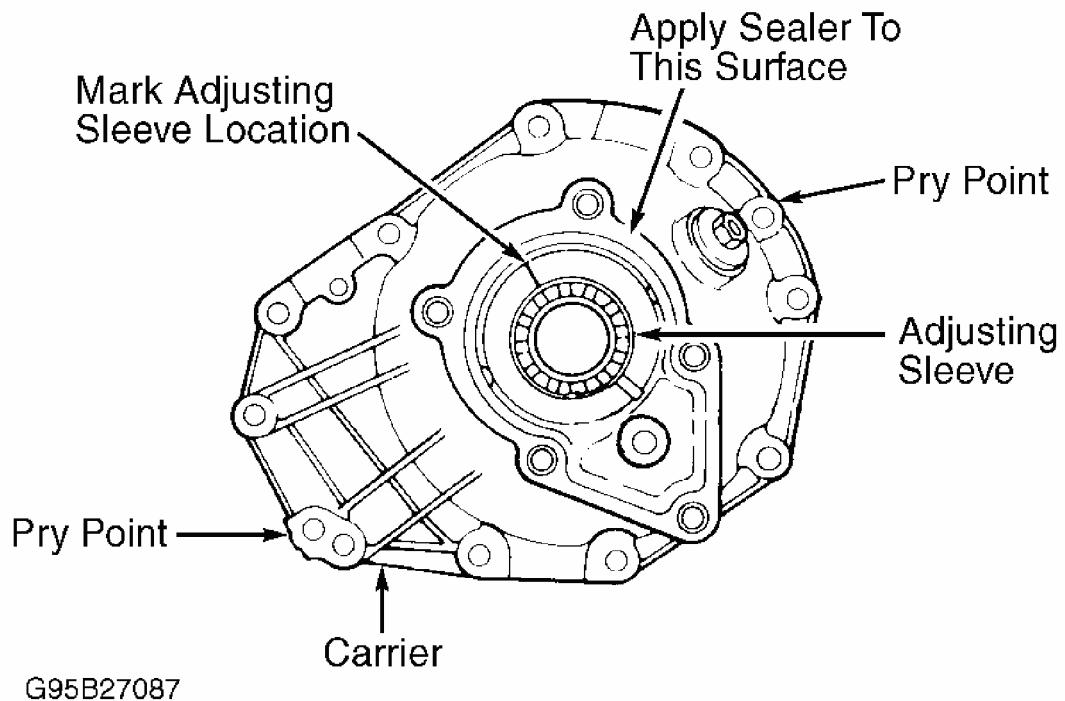


Fig. 17: Marking Adjusting Sleeve Location
Courtesy of GENERAL MOTORS CORP.

4. Mount base clamp of Dial Indicator Set (J-8001) so gauge plunger button contact outer edge of pinion flange. Ensure plunger is at right angle to flange. See **Fig. 18**. Move pinion flange through its free play travel while holding differential carrier and ring gear stationary. Record dial indicator reading. Divide dial indicator reading by 2 to obtain backlash reading.

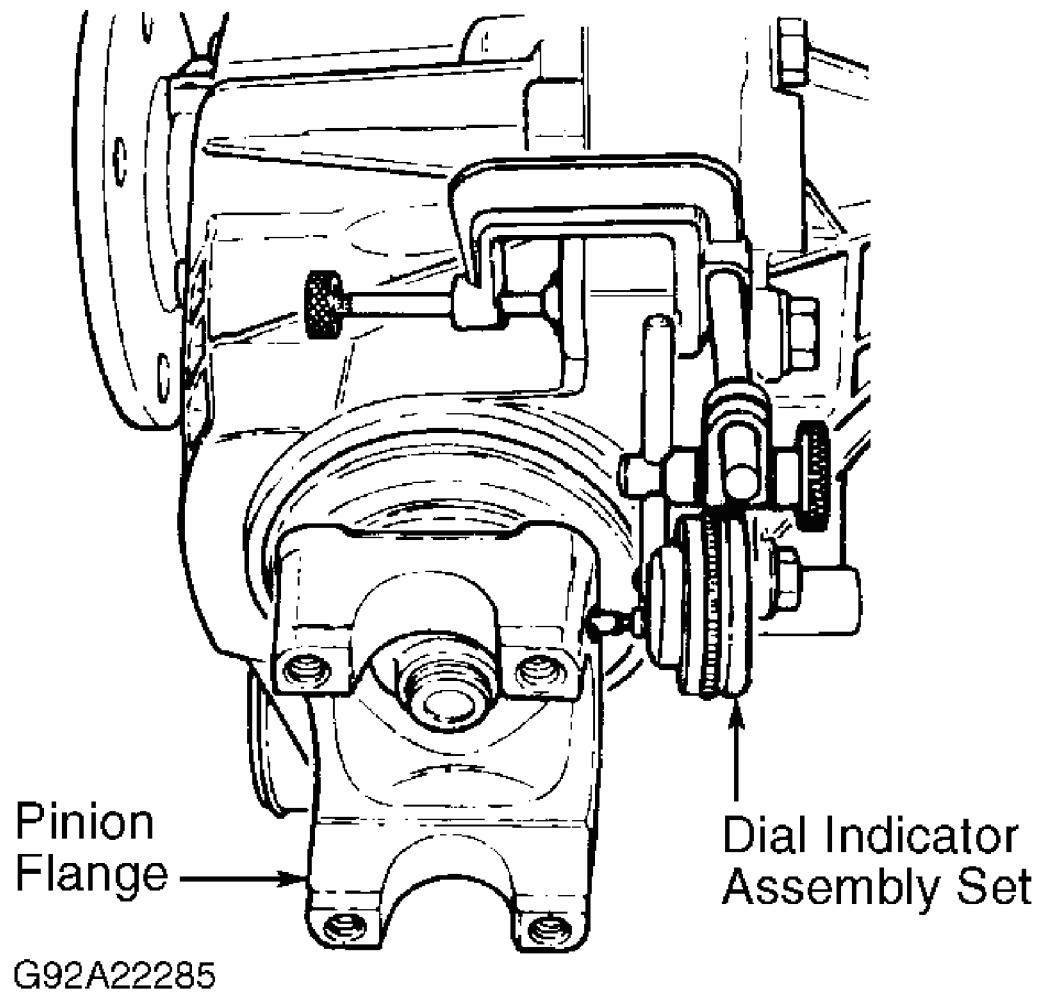


Fig. 18: Measuring Backlash At Pinion Flange
Courtesy of GENERAL MOTORS CORP.

5. Inspect and record backlash at 3 or 4 points. Hold case stationary when checking backlash. If backlash varies more than .002" (.05 mm), check for burrs, distorted case flange, uneven bolting or foreign matter between case and ring gear. Gear backlash at pinion flange should be .003-.010" (.08-.25 mm), with a preferred measurement of .005-.007" (.13-.18 mm). If backlash is not within specification, equally turn adjusting sleeves as necessary. Maintain one notch preload on side bearings. For example, if right sleeve needs to be turned out one notch, turn left sleeve in one notch.
6. To increase backlash, turn left sleeve in and turn right sleeve out an equal amount. To decrease backlash, turn right sleeve in and turn left sleeve out an equal amount. Turning sleeve one notch will change backlash about .003" (.08 mm). DO NOT install sleeve locks yet.

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

7. When backlash is within specification, mark position of sleeves and perform gear tooth contact pattern check. See GEAR TOOTH CONTACT PATTERNS article in GENERAL INFORMATION. When pattern is satisfactory, continue at step **15**) of REASSEMBLY under differential carrier under OVERHAUL.

AXLE ASSEMBLY SPECIFICATIONS

AXLE ASSEMBLY SPECIFICATIONS

Application	In. (mm)
Ring Gear Backlash	
Preferred	.005-.007 (.13-.18)
Allowed	.003-.010 (.08-.25)
Ring Gear Runout (Maximum)	.002 (.05)
	INCH Lbs. (N.m)
Pinion Bearing Preload	15-25 (1.7-2.8)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Axle Assembly-To-Frame Bolts	76 (103)
Axle Hub Nut	103 (140)
Ball Joint Nut (Upper)	61 (83)
Cable Switch Housing Bolts	36 (49)
Carrier Case Bolts	37 (50)
Drain & Fill Plugs	19 (26)
Front Drive Shaft-To-Flange Bolts	15 (20)
Idler Arm-To-Steering Relay Rod Nut	60 (81)
Left Output Shaft Cover Bolts	18 (24)
Pitman Arm-To-Steering Relay Rod Nut	61 (83)
Right Axle Housing-To-Carrier Bolts	36 (49)
Right Axle Housing-To-Frame Bolts	72 (98)
Ring Gear Bolts ⁽¹⁾	59 (80)
Shock Absorber Lower Mounting Nut	54 (73)
Skid Plate Bolts	18 (24)
Stabilizer Bar Bushing Bracket-To-Frame Bolts	48 (65)
Stabilizer Bar-To-Lower Control Arm Bolts	11 (15)
Tie Rod End Nut	39 (53)
Wheel Lug Nuts	103 (140)

2001 Chevrolet S10 Pickup

2000-01 DRIVE AXLES Front Axle - "T" Series

	INCH Lbs. (N.m)
Adjusting Sleeve Lock Bolt	71 (8)
Shift Cable Coupling Nut	89 (10)

(1) Always use NEW bolts. Bolts are left-hand thread.